

REMARKS

This amendment is submitted in an earnest effort to bring this application to issue without delay.

Applicants wish to reiterate their claim to the benefit of their German priority date of 19 July 2002 according to the international convention. A certified copy of German Patent Application 102 33 069.7 filed 19 July 2002 has been made of record in PCT/EP 2003/005903 filed 5 June 2003 of which the instant application is the US National Phase. The Examiner has already acknowledged Applicants' perfected right of priority.

Applicants have canceled original claims 1 through 4 and are submitting new claims 5 through 9. Antecedent basis for the new claims may be found in the specification on page 2, line 20 through page 5, line 1 and in the sole figure in this application. Thus claims 5 through 9 are now in this application and are presented for examination.

The Examiner has rejected independent claim 1 under 35 USC 112, second paragraph, as indefinite, and has objected to this claim as well for using inconsistent terminology. Applicants have canceled claim 1 as well as the dependent claims 2 through 4 and replaced those claims with new claims 5 through 9. Applicants

believe that the new claims fully respond to all of the Examiner's bases for rejection and objection to the claims. In all claims now presented Applicants use the expression "consisting essentially of" to define the specific hydrocarbons present in the gaseous and liquid phases at each stage in the process. Furthermore in new claim 8, which replaces claim 4, it is clear that the water that accumulates in the compression step is not a part of the liquid phase containing C₄+ olefins, but is a third stream comprising water that is recycled back to an earlier stage in the process.

New claims 5 through 9 focus on what Applicants believe to be most important in distinguishing the presently claimed invention over the disclosure in the Assignee's US Patent 5,981,819, which is the sole reference cited against the present application as a basis for the obviousness of the invention.

The Examiner argues that all claims originally presented are obvious in view of US Patent 5,981,819 to MOELLER et al. The Examiner has picked up on some of the differences between the present process and the MOELLER et al process. The Examiner notes that Applicants alone employ a two part cooling step following the adiabatic reaction of the hydrocarbon-water vapor mixture over the fixed bed zeolite catalyst, where a heat exchange step at 100 to 200 ° C is followed by a quenching step at a temperature in the 60° C range. The prior art uses only the quenching step, and in any event uses only a single cooling step instead of a double cooling

step as in the present process. The Examiner argues, however, that the one step cooling and the two step cooling are equivalent. The Examiner also notes that Applicants employ a compression step following the quenching step and preceding the distillation step to obtain the desired light hydrocarbon product rich in propylene. The Examiner argues, however, that the compression step would be obvious to those skilled in the art, that is to maintain the optimum pressure during the separation by distillation to obtain the maximum propylene in the product recovered.

What the Examiner has not focused on, however, is that the product that Applicants obtain according to their process is not the same product that is obtained according to the MOELLER et al process. The MOELLER et al process according to the specific examples obtains a product that is slightly more than one-half propylene, but that contains a significant amount of butylene isomers, almost as much butylene isomers as propylene. Applicants clearly define their product as consisting essentially of propylene, ethylene, and other light hydrocarbons, and clearly show a separation of butylenes and other hydrocarbons having more than four carbon atoms from their desired product. Applicants also note that on page 4, line 18 of the present application, Applicants disclose that their product contains about 75% propylene. The examples in MOELLER et al show products that contain propylene and butylene both in significant amounts, with the propylene content amounting to only a little more than 50% of the product. Thus the

product obtained according to the present process is a different product from the one obtained according to MOELLER et al and so it is incorrect for the Examiner to conclude that the prior art single cooling step and the Applicants' two-part cooling steps are either identical steps or equivalent steps. Thus it is also incorrect to conclude that the Applicants' process which obtains propylene in high yield would be obvious from reading the reference.

Concerning the obviousness objection of the examiner in view of US-Patent 5,981,819 by MOELLER et al, Applicants provide the following direct comments:

In principle, Applicants agree with the analysis of the Examiner that there are at least two main differences between the method according to present application and the method disclosed by MOELLER et al. First, according to the present application a two part cooling step is executed following the adiabatic reaction over the fixed bed zeolite catalyst employed in a quenching column (13) and a further distillation column (18). Second, this two step cooling is combined with an intermediate compression step for increasing the pressure of the gaseous phase withdrawn from the quenching column (13) up to 20 to 30 bar, before feeding this compressed gaseous phase containing hydrocarbons into the distillation column (18). Thus, Applicants can not agree with the Examiner's opinion, that the prior art one step cooling and the presently claimed two step cooling are equivalent. This is also

supported by the fact that the compressor (15) employed during step (f) of the present process has not only the function of compressing the mixture up to 20 to 30 bar, but has also the function of separating the mixture into a liquid water stream, a gaseous and a liquid phase containing hydrocarbons withdrawn from the compressor (15) via lines 14, 16, and 17, respectively. This combination was not obvious for the skilled person.

It was also not obvious to increase the pressure of the mixture conducted from the reactor (9) up to 20 to 30 bar. As it has also been described on page two of the present application, it was known to cool the gas stream from the reaction vessel in a heat exchanger to a temperature of 100 to 200°C, to compress it to a pressure of 2 to 6 bar, to charge the gas stream afterwards to the condensation side of an evaporator / condenser, and to conduct the hydrocarbons that remained in the gaseous phase to a gasoline /olefin-splitter. This known method is equivalent to the process disclosed by MOELLER et al. However, the pressure increase of the mixture withdrawn from the reactor to 20 to 30 bar according to step (f) of the process covered in claim 5 constitutes a 10-fold higher pressure on average than described according to the prior art. This is definitely one of the distinguishing features of the present application as presently claimed which gives rise to the remarkable high content of propylene in the head product according to the present application (about 75% by weight) according to claim 5, step (g) and emphasized in claim 9. This difference in pressure according to the process of claim 5, step (f) is in all probability

the reason for the high content of propylene, but the high yield of propylene was totally unexpected .

Further, the Examiner argues on page 5 of the office action that the organic phase (14) of MOELLER et al is equivalent to the claimed gaseous phase containing essentially ethylene, propylene, C4 to Ca olefins and additional hydrocarbons. However, Applicants maintain that the sum of the olefinic product (15) and the C3 / C4 olefins from line (18) according to MOELLER et al, both of which contain C3 hydrocarbons, are equivalent in terms of total C₃ to the gaseous product withdrawn via line (19) from the distillation column (18) according to the present application, and claim 5, step (g). However, Applicants alone obtain a single hydrocarbon stream, rich in propylene, consisting essentially of 75% propylene. See claim 5, step (g) and claim 9. Thus, it becomes clear, that the subject matter of the present application is not obvious in view of the US-Patent 5,981,819 of MOELLER et al.

Applicants believe that all claims now presented are in condition for allowance and a response to that effect is earnestly solicited.

Respectfully submitted,
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Enclosure:
None.